

FS50SMJ-3

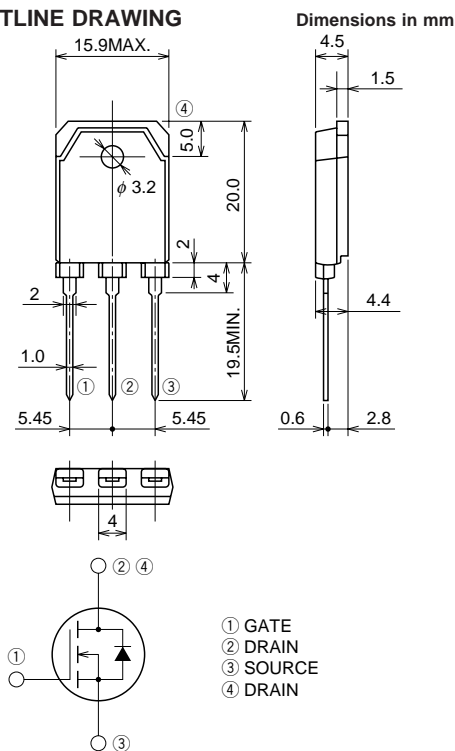
HIGH-SPEED SWITCHING USE

FS50SMJ-3



- 4V DRIVE
- V<sub>DSS</sub> ..... 150V
- r<sub>DS</sub> (ON) (MAX) ..... 30mΩ
- I<sub>D</sub> ..... 50A
- Integrated Fast Recovery Diode (TYP.) ..... 125ns

OUTLINE DRAWING



TO-3P

APPLICATION

Motor control, Lamp control, Solenoid control  
DC-DC converter, etc.

MAXIMUM RATINGS (T<sub>c</sub> = 25°C)

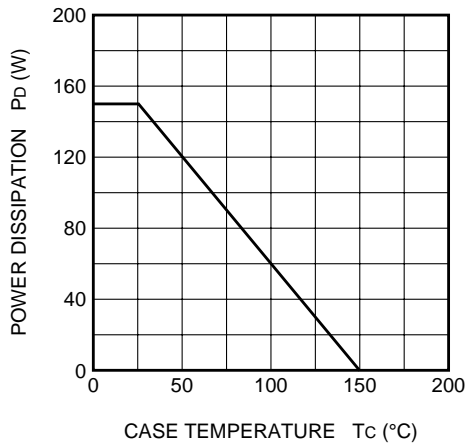
Symbol	Parameter	Conditions	Ratings	Unit
V <sub>DSS</sub>	Drain-source voltage	V <sub>GS</sub> = 0V	150	V
V <sub>GSS</sub>	Gate-source voltage	V <sub>DS</sub> = 0V	±20	V
I <sub>D</sub>	Drain current		50	A
I <sub>DM</sub>	Drain current (Pulsed)		200	A
I <sub>DA</sub>	Avalanche drain current (Pulsed)	L = 100μH	50	A
I <sub>S</sub>	Source current		50	A
I <sub>SM</sub>	Source current (Pulsed)		200	A
P <sub>D</sub>	Maximum power dissipation		150	W
T <sub>ch</sub>	Channel temperature		-55 ~ +150	°C
T <sub>stg</sub>	Storage temperature		-55 ~ +150	°C
—	Weight	Typical value	4.8	g

ELECTRICAL CHARACTERISTICS (T<sub>ch</sub> = 25°C)

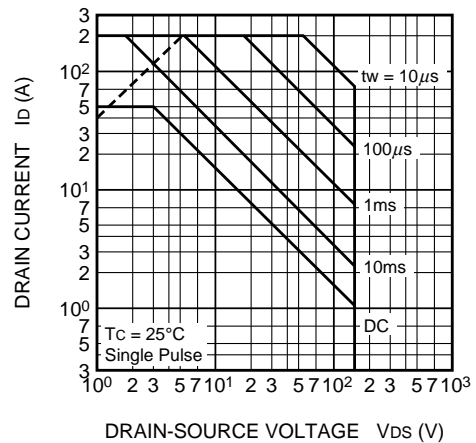
Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V <sub>(BR)DSS</sub>	Drain-source breakdown voltage	I <sub>D</sub> = 1mA, V <sub>GS</sub> = 0V	150	—	—	V
I <sub>GSS</sub>	Gate-source leakage current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	—	—	±0.1	μA
I <sub>DSS</sub>	Drain-source leakage current	V <sub>DS</sub> = 150V, V <sub>GS</sub> = 0V	—	—	0.1	mA
V <sub>GS(th)</sub>	Gate-source threshold voltage	I <sub>D</sub> = 1mA, V <sub>DS</sub> = 10V	1.0	1.5	2.0	V
r <sub>DS(on)</sub>	Drain-source on-state resistance	I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V	—	23	30	mΩ
r <sub>DS(on)</sub>	Drain-source on-state resistance	I <sub>D</sub> = 25A, V <sub>GS</sub> = 4V	—	24	32	mΩ
V <sub>DS(on)</sub>	Drain-source on-state voltage	I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V	—	0.58	0.75	V
y <sub>fs</sub>	Forward transfer admittance	I <sub>D</sub> = 25A, V <sub>DS</sub> = 10V	—	62	—	S
C <sub>iss</sub>	Input capacitance	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz	—	8200	—	pF
C <sub>oss</sub>	Output capacitance		—	870	—	pF
C <sub>rss</sub>	Reverse transfer capacitance		—	440	—	pF
t <sub>d(on)</sub>	Turn-on delay time	V <sub>DD</sub> = 80V, I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = R <sub>GS</sub> = 50Ω	—	54	—	ns
t <sub>r</sub>	Rise time		—	110	—	ns
t <sub>d(off)</sub>	Turn-off delay time		—	850	—	ns
t <sub>f</sub>	Fall time		—	340	—	ns
V <sub>SD</sub>	Source-drain voltage	I <sub>S</sub> = 25A, V <sub>GS</sub> = 0V	—	1.0	1.5	V
R <sub>th(ch-c)</sub>	Thermal resistance	Channel to case	—	—	0.83	°C/W
t <sub>rr</sub>	Reverse recovery time	I <sub>S</sub> = 50A, di <sub>S</sub> /dt = -100A/μs	—	125	—	ns

PERFORMANCE CURVES

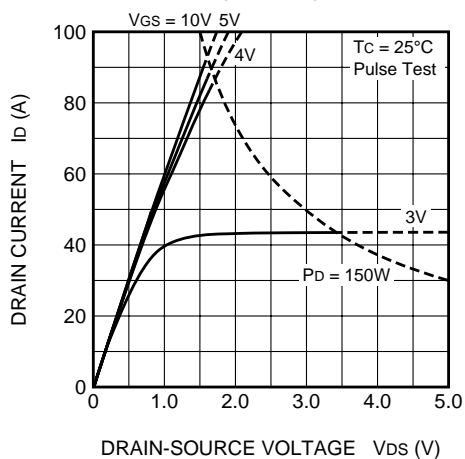
POWER DISSIPATION DERATING CURVE



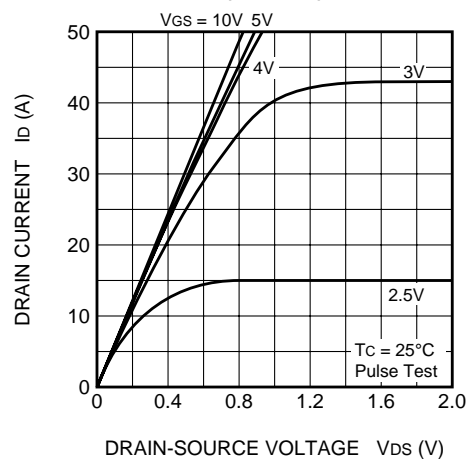
MAXIMUM SAFE OPERATING AREA



OUTPUT CHARACTERISTICS (TYPICAL)

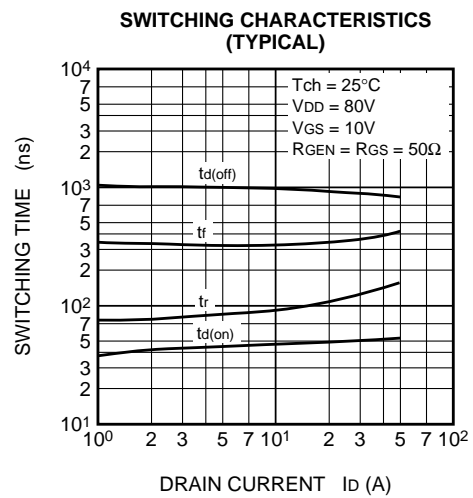
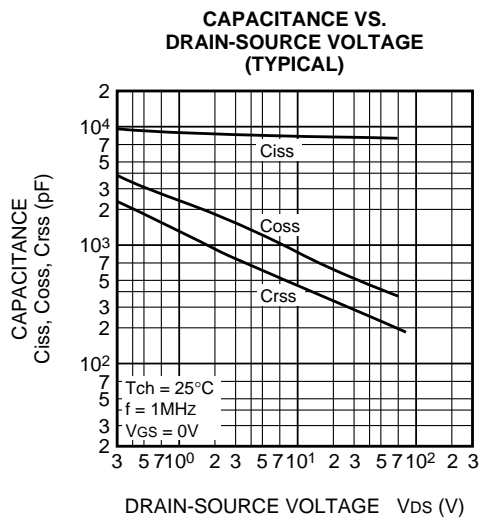
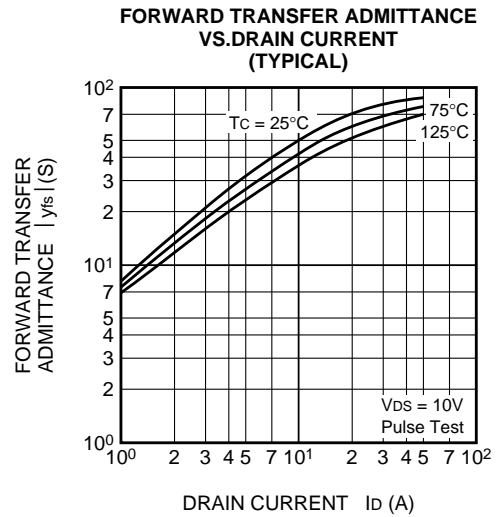
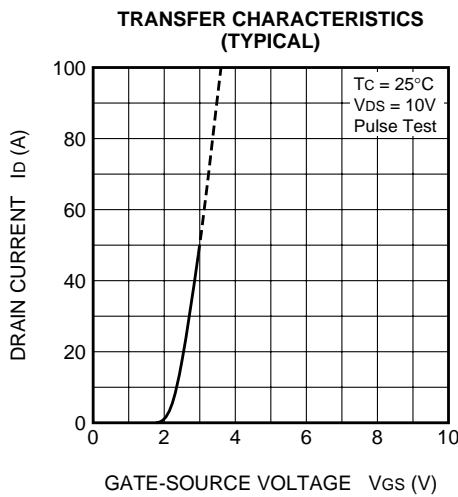
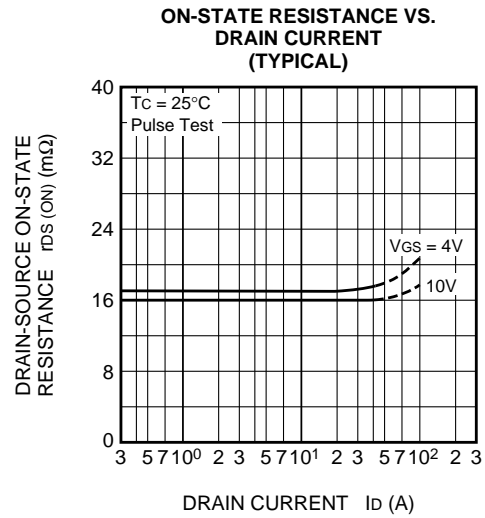
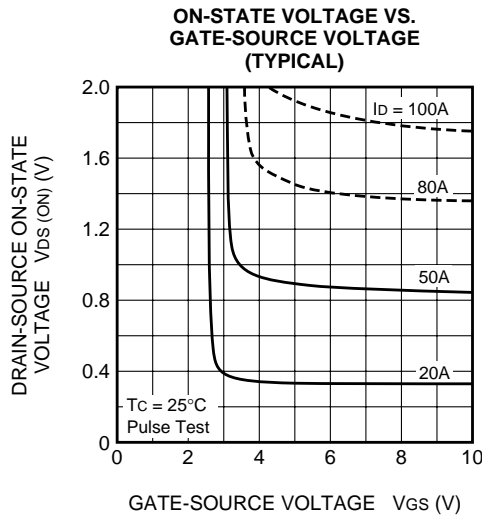


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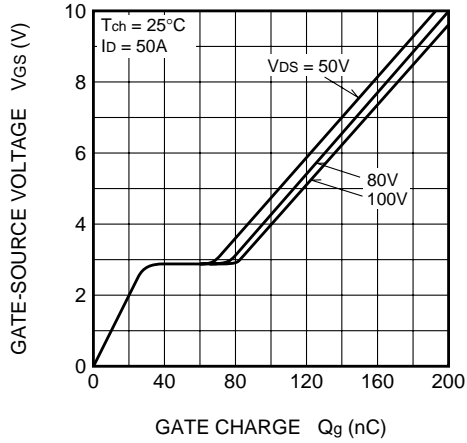


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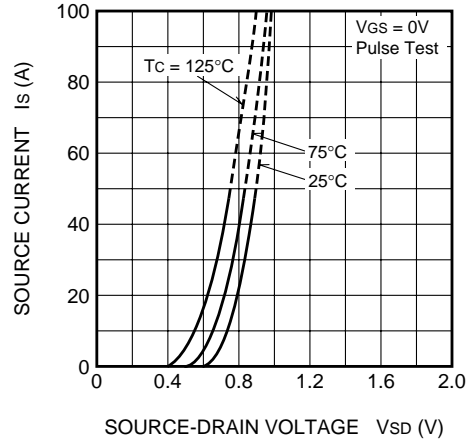
## HIGH-SPEED SWITCHING USE



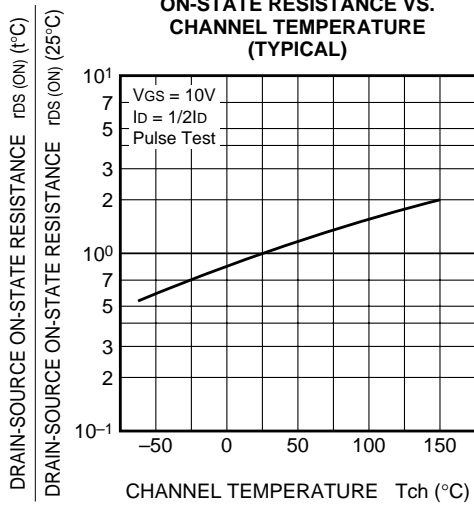
**GATE-SOURCE VOLTAGE  
VS. GATE CHARGE  
(TYPICAL)**



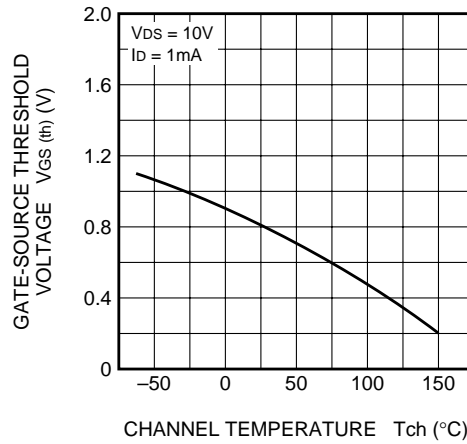
**SOURCE-DRAIN DIODE  
FORWARD CHARACTERISTICS  
(TYPICAL)**



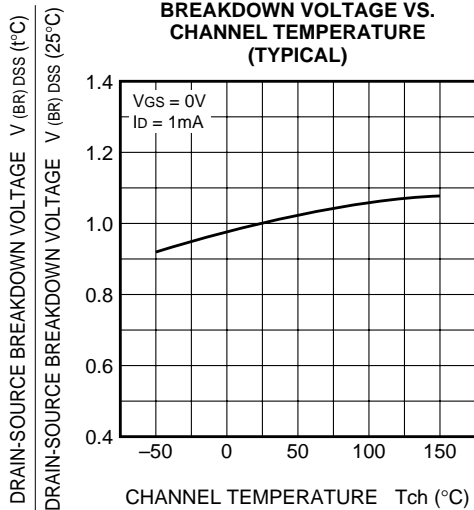
**ON-STATE RESISTANCE VS.  
CHANNEL TEMPERATURE  
(TYPICAL)**



**THRESHOLD VOLTAGE VS.  
CHANNEL TEMPERATURE  
(TYPICAL)**



**BREAKDOWN VOLTAGE VS.  
CHANNEL TEMPERATURE  
(TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE  
CHARACTERISTICS**

